# Helping to Solve Global Problems

Jack Dangermond is the co-founder and president of ESRI, a privately held geographic information systems (GIS) software company that is headquartered in Redlands (CA, USA). In 1969, he co-founded ESRI (Environmental Systems Research Institute) with his wife, Laura. Originally, the company concentrated on land use analysis, but increasingly focused on developing GIS software. ESRI became a leader in the GIS industry during the 1980s and continues to develop and support the most widely used GIS technology.<P>

**Can you describe the vision of ESRI, what are your ideas on the use of spatial information?**
While our software products and services have changed greatly over the years because of user needs and advances in technology, our company goals have been very consistent. Customer service is important to ESRI ( 8 1) and our commitment is reflected in our product development and support.
Among the numerous uses of spatial information, I believe that GIS will be used increasingly to help solve the global environmental and social problems that we currently face. Many of our users share this vision and we will continue to support them in their efforts to develop sustainable solutions.

**How do you consider the role of ESRI in the world of data processing, data analysis, data visualisation and GIS?**
ESRI's ArcGIS product suite provides an extendable solution for data processing, analysis and visualisation that scales from the desktop to the enterprise as organisations and needs for GIS capabilities grow. Our mobile products collect field data for on-site analysis and transmittal, while our server-based systems deliver GIS capabilities over existing networks.
GIS technology is used in a multitude of disciplines, providing a unique, location-based perspective of information that promotes better, timelier decisions because of its broad collaborative and analytical capabilities.

**Originally, ESRI focused on the development of GIS tools for land-based analysis. Can you explain how your tools and software are used and can be used in the field of data acquisition and data processing for the hydrographic world?**
We have built a number of data models that facilitate the use of ArcGIS in hydrographic applications. Our Arc Marine data model is the result of a collaboration between ESRI, the Danish Hydraulic Institute (DHI), the US National Oceanic and Atmospheric Administration, Oregon State University and Duke University. The model considers how marine and coastal data can be most effectively integrated in 3D and 4D space and time, and includes an approach towards a volumetric model to represent the multidimensional and dynamic nature of ocean data and processes. Our Arc Hydro data model is used for surface water applications and our Groundwater data model is used to represent multidimensional groundwater data. This is an area of rapid growth in the GIS community.

**Is there, in your view, any difference between land-based and hydrographic surveying and data analysis?**
Although the underlying data management technology is similar, the data models used and analyses performed are different. For example, the datum for bathymetric digital elevation models (DEMs) is not the same as that used by the US Geological Survey (USGS) for land-based DEMs. Also, the shoreline for the USGS DEMs is indeterminate and not the same as that used for the bathymetric DEMs. The differences in these data models permit efficient, unique analyses for each domain. Data analysis with land-based systems includes specialised analysis for planning, cadastral management and other terrestrial unique applications, while in the hydrographic domain other modelled data are important such as gauge station recordings, sounding type and current.

**Through its applications, Google facilitates sharing geospatial information. What is your opinion on freely accessible geospatial information?**
The availability of public domain data and simple viewing software, such as Google Earth, provides a quick snapshot of a selected area. Our free ArcGIS Explorer software not only allows access to similar content, but also lets the user perform true GIS analysis using tasks including visibility, modelling and proximity search from more than 24GB of free hosted content that is worldwide in scope. Additionally, ArcGIS Explorer can connect to other published web services for visualisation and analysis.

Regarding the larger issue of whether publicly collected data should be free or for sale, there really is no such thing as free data. The real issue is making maximum use of the collected information and providing sufficient funding to sustain the regular updating of that information.

What do you foresee as important developments in sharing geospatial information??
The interest and development of spatial data infrastructures (SDIs) is particularly important to the process of data sharing. The European Union's INSPIRE Directive will provide a uniform platform for sharing data throughout Europe.

Standards are critical in promoting and supporting the sharing of spatial data. ESRI supports appropriate specifications as they become finalised, and participates in the development of GIS standards with active involvement in the International Organization for Standardization (ISO) and the Open Geospatial Consortium (OGC). ESRI's software also supports leading defacto industry standards

such as XML, SOAP and SQL.

**What do you foresee as important developments in the visualisation of this information?**
While GIS visualisation capabilities are growing rapidly, strong data management and data integration functionality is critical for efficient visualisation. As hydrographers and other professionals in this area expand their use of GIS and develop new capabilities for the technology, there will also be the discovery and development of new ways to view and analyse hydrographic and geographic data.

**Do you expect GIS to become more important in hydrography in the coming years? If so, how do you think this will affect the work and position of the hydrographic surveyor?**
The accuracy and resolution of data collection is rapidly evolving to encompass geographic and hydrographic data of all types. Centralised data management and real-time data collection will become the norm. While these data sets continue to expand in size and content, GIS provides scalable capabilities to manage them. GIS has the tools to manage, integrate, visualise and analyse this data.

**Does this imply changes in the educational system for hydrography?**
As we see in many fields of study, GIS is becoming part of the core curriculum. With the ability to visualise and perform complex analysis using large and disparate data sets, new ways to teach and understand the world are becoming evident through GIS technologies and methodologies.

**Is ESRI involved in educational programmes? If so, how?**
Education is a cornerstone of the ESRI community. Thousands of schools, from primary to university, have included ArcGIS courses and applications in their curricula. ESRI provides comprehensive course materials and stages an annual international Education User Conference. In addition, we recently expanded our own training programmes and facilities. Today, we offer hundreds of courses at various training sites around the world, as well as online courses, live training seminars and podcasts. ESRI also supports a number ofgrants for GIS training.

**Do you have a message for our readers?**
New applications for GIS will continue to be developed at an increasing rate because of GIS' ability to provide a logical basis for data organisation and analysis in virtually all disciplines. The spatial component of the technology engenders a unique capability to communicate ideas and concepts within a society in general and will allow it to play a significant part in developing sustainable solutions toour impending global challenges